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EVALUATING THE ROLE OF INTRODUCTORY LESSONS IN OUTDOOR ENVIRONMENTAL ACTIVITIES

S. PLAZA[a], J. M. RABANAL[b], J. A. DELGADO[a]*

[a]*Departamento de Ecología, Facultad de Biología, Universidad Complutense de Madrid, C/José Antonio Nováis 2, 28 040 Madrid, Spain*
E-mail: *delgado@bio.ucm.es*
[b]*Instituto Madrileño de Investigación y Desarrollo Rural, Agrario y Alimentario, Finca 'El Encín' Alcalá de Henares, Spain*

Abstract. We assessed the independent impacts both of an introductory in-class lesson and an outdoor lesson on test scores in a group of Spanish schoolchildren. Our main aim was to assess whether either type of lesson interacted or whether their effects were additive. We tested total of 139 grade 4 students (age 9–10) from 4 Spanish primary schools using a factorial design, taking into account school and student gender. The outdoor experience consisted of a talk on the main species of flora and fauna (birds and mammals) during a walk through the forest and also included a set of rules for good conduct. The introductory lessons at the schools consisted of a talk on the same topics with the aid of pictures. Following the lessons, selected students filled in a questionnaire which we used to evaluate increased knowledge. The results showed that outdoor activity, training lesson and school had a strong influence on total score. However, we have not found a synergic effect between the training lesson and the outdoor activity. Thus, it was concluded that a previous in-class lesson increased students knowledge and, although it was not obligatory to obtain the benefits of the outdoor activity, it might be useful with regard to linking in-class and outdoor environments.

Keywords: outdoor education, flora, fauna, nature conservation.

AIMS AND BACKGROUND

In this paper we addressed the evaluation of the impact both of an introductory in-class lesson and an outdoor activity on the results of a test in a group of Spanish schoolchildren. One of the aims of the study was to assess whether there was an interaction between both kinds of lessons or, on the contrary, whether the contribution of both lessons could be assessed independently. Interaction between both lessons would imply that the success of the outdoor activity would greatly depend on the in-class lesson. On the other hand, a lack of interaction would indicate that the relative contribution of both lessons could be clearly ascertained and that their effects on student knowledge would be additive.

Environmental education is a cross-curricular theme within the Spanish primary school syllabus. Nevertheless, environmental education activities are usually

* For correspondence.

organised by natural science teachers since outdoor activities are considered both not only an important tool for teaching biology and related sciences[1,2], but also a key point in environmental education[3]. Preparation, however, of even a one-day off-site visit implies thorough preparation and planning by the teacher. Furthermore, as outdoors activities can be rather disruptive, natural sciences teachers are compelled to minimise the number of out-of-school activities, maximising learning outcomes. In order to improve the success of the outdoor activity, one day of in-class work is often used to prepare pupils for the fieldwork. Information on the site to be visited including the most common species of flora and fauna, tasks to be developed and rules of good conduct are common themes in this kind of lessons. Introducing the students to the site characteristics and the main themes they will be dealing with prior to the field trip could be positive with a view to improving student interest and to facilitating acquisition of new knowledge during the outdoor visit[4].

The impact of an outdoor activity could be evaluated by means of comparison of test results before and after the event. This approach, however, did not allow the effect of the outdoor lesson to be assessed separately from the in-class introductory lesson. Furthermore, neither was it possible to assess the impact of the introductory lesson on the effects of the outdoor lesson in relation to students scores (i.e. whether there is some kind of interaction between both types of lessons). Performing such an evaluation would require a factorial analysis using data from 4 independent groups of tests: (1) before any lesson; (2) after the introductory lesson; (3) after the outdoor lesson, but without a previous introductory lesson, and (4) after both types of lessons.

EXPERIMENTAL

We included in our study a total of 139 grade 4 students (age 9–10) from 4 Spanish primary schools. Treatments were assigned randomly to approximately the same number of students in each school. Thus, we obtained 4 groups within each school (Table 1): (i) students with an introductory lesson but no outdoor activity; (ii) students with an outdoor activity but no introductory lesson; (iii) students with both activities, and (iv) a control group, students with no activities.

Table 1. Groups of students involved in the study

Group	Female students	Male students
Introductory lesson – outdoor	22	14
Introductory lesson – no outdoor	19	17
No introductory lesson – outdoor	18	16
Control group	17	16
Total	76	63

Those assigned to the control group performed the test prior to attending any type of lesson. Students from each school belonging to the 'Introductory Lesson – No Outdoor' and 'Introductory Lesson – Outdoor' groups attended the introductory lesson but only the former group performed the test. The outdoor experience was performed within the following 7 days and, although all students attended, only those from the 'No Introductory Lesson – Outdoor' and 'Introductory Lesson – Outdoor' groups completed the questionnaire.

To control differences in teaching procedures, the introductory lessons at the schools were developed by one of the authors (S. Plaza) and consisted of a talk on the same topics with the aid of pictures. After the lessons, selected students filled in a questionnaire which we used to evaluate any increase in their knowledge. The questionnaire consisted of 15 specific questions. It covered 2 domains: (a) student knowledge of plants and animals; (b) students knowledge of good-conduct rules.

The outdoor experience was performed in a semi-natural area close to Alcalá de Henares (Madrid, Central Spain). All the visits (1 per school) were guided by monitors from a group of female adult (25–40-year old) workers from a wilderness education program promoted by our Research Institute (IMIDRA). Due to organisational problems, it was not possible to assign the same monitors to the selected groups. Nonetheless, they all strictly followed the same program. The outdoor experience consisted of a talk about the main species of flora and fauna (birds and mammals) during a walk through the forest. In order to reduce the human impact in the area and to promote a sense of respect for nature, the talk also included a set of good conduct rules (e.g. 'Please do not disturb plants or animals', 'Please do not dump rubbish or talk loud').

The experimental design could be defined as a complete block design in which schools act as blocks. As we expected students from different schools to present different scores in the questionnaire, we used the school as a factor in the analyses in order to remove its possible effect and to more reliably measure the effect of the treatments selected. Gender is also a possible source of variation, because male and female students have been reported to differ in study behaviour[5,6], spatial visualisation[7], achievement in mathematics[8] and environmental attitudes[9]. We, therefore, performed comparisons of students scores in the different groups with full-factorial ANOVA, considering outdoor activity and training lesson as treatments, but controlling for gender and school.

RESULTS AND DISCUSSION

There were no significant interaction effects between factors (Outdoor × Lesson $P > 0.1$). This result implies that the independent effect of the different treatments could be clearly assessed. Thus, we performed the analysis once again without

considering interactions in the model. The results showed that outdoor activity, introductory lesson, and school had clear effects on student scores (Table 2).

Table 2. ANOVA results for students total score

	Degree of freedom	*F*-value	*P*-value
Outdoor	1	190.28	< 0.001
Lesson	1	275.94	< 0.001
School	3	20.81	0.008
Gender	1	3.70	0.055

Note: All interactions between factors were not significant and, therefore, excluded from the analyses.

Students experiencing the outdoor activity after the introductory lesson obtained the highest score and the control group the lowest one (Table 3). Students who followed the introductory lesson but who did not perform the outdoor activity obtained the same result as those who experienced the outdoor activity without previous information. The effect of gender was marginally significant (Table 2), with female students presenting higher scores than males (females: 9.25±4.20, males: 9.05±4.33).

Table 3. Results of ANOVA comparing mean scores

Group	Number of students	Mean ± standard deviation
Introductory lesson – outdoor	36	12.7 ± 1.9 a
Introductory lesson – no outdoor	36	10.6 ± 2.3 b
No introductory lesson – outdoor	34	10.1 ± 2.8 b
Control group	33	7.5 ± 2.3 c

Note: Mean scores were obtained by students from different treatment groups, data on boys and girls from all schools were combined. Different letters represent significant difference between treatments.

These results suggest that both in-class introductory and outdoor lessons are equally effective, regardless of sex (not significant interaction). Females presented higher scores than males, but these differences were only marginally significant. Although differences between sexes in scientific knowledge and environmental perception has been reported in several studies, these differences appear to develop with age and are, therefore, less evident in young children[5,8,10]. As was expected, different schools showed different scores. This result might reflect the different socioeconomic environments of the neighbourhoods where schools are located[9,11,12] or, on the other hand, might be merely a consequence of differences in school syllabuses.

More interesting is the fact that both the in-class introductory and outdoor lessons had independent effects on students scores. In other words, the effect of

both lessons were additive. As it could be observed in Table 3, the contribution in terms of the average score of each lesson was about 2.5 points over the basic knowledge level of the students. The increase in the average score of students who received both lessons is the sum of the independent contribution of each lesson (5 points).

The existence of an additive effect constitutes a key issue, as it highlighted the fact that the success of an outdoor activity could be independent from a previous in-class lesson. We do not wish to claim that the in-class preparation was of no use to the students, but rather to highlight the fact that the benefits of outdoor visits might be of use even without previous student preparation.

Outdoor activities favour the teacher–student connection and are usually more motivating for students and lead to greater knowledge of nature and pro-environmental attitudes[3,13–15]. Nonetheless, in our study, both kinds of lessons were equally effective with regard to increasing student knowledge of the environment. This result might be due to the fact that the in-class lesson was taught by one of the authors rather than by the usual teacher. This novelty, along with the use of numerous pictures, might have helped to render the lesson innovative. Thus, the class was at least as exciting for the students as an outdoor lesson.

In short, our study suggests that introductory lessons have an additive effect on the results of an outdoor activity. This study, however, deals only with questions that were answered just a few minutes after lessons; the long-term effects of these lessons might reveal a different trend. Furthermore, the introductory lesson also had secondary objectives. For example, it could constitute the first step in the integration of outdoor activities into the daily in-class work. This type of integration should include the collaboration of other subjects on the syllabus (mathematics, art, language) in order to reduce the disruptive effects of outdoor classes and to endow the in-class work with the same degree of the fun and excitement that the field work arouses in teachers and students.

CONCLUSIONS

We found that although gender showed only a marginal effect, outdoor activity, training lesson and school showed a strong effect on total test scores after testing in a group of 139 grade 4 students (age 9–10) from 4 Spanish primary schools, using a factorial design. We did not found a synergic effect, but rather an additive one between the training lesson and the outdoor activity. We concluded that a previous in-class lesson increased students knowledge, but it was not mandatory to obtain the benefits of the outdoor activity.

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